Multifunctional proteins for hair protection and coloring

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Hair is a complex protein-based fibre that plays a key role for the perception of human beauty. Human hair is composed mainly by proteins, lipids, water and pigments. The protein content is approximately 65 to 95%, and the major classes of hair proteins is composed by keratins. Hair's lightening is achieved by the degradation of the melanin pigment in a process designated by bleaching. This process causes a huge damage in the hair, proved by the decrease of it mechanical properties, shine and strength. [1]
There are already formulations composed by proteins which are capable to create suitable environments for healthy hair due to their water binding potential and amphoteric and buffering properties. Although these proteins can be used before or after the bleaching process to avoid hair damage, they do not have a role in the coloration of hair or in the properties of the hair colour. The main goal of the work was the bioproduction and application of multifunctional proteins for hair protection and coloration. These proteins simultaneously protect and colour the hair, without the need to use the traditional bleaching techniques that drastically damage hair. Crystallins, reflectins and chromogenic proteins were used in the design of the multifunctional proteins. Human γD-crystallin were used as restorative agents based on their ability to form thin coatings around hair fibres due to the presence of Greek key motif on its structure. [2] Reflectins and chromogenic proteins were used for the colouring of the hair fibres.
The multifunctional proteins will be used for the development of new hair cosmetic products with a high commercial potential.

[1] Robbins CR (2001) Chemical and Physical Behavior of Human Hair.

[2] Ribeiro A, Matamá T, Cruz CF, Gomes AC, Cavaco-Paulo AM (2013) Potential of human γD-crystallin for hair damage repair: Insights into the mechanical properties and biocompatibility. Int J Cosmet Sci 35:458–466. doi: 10.1111/ics.12065